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Struggles of Diabetes Management for College Students

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ABSTRACT

While it is often stated that college is a particularly difficult time for diabetes self-management, only a few studies have examined the specifics of living with diabetes during this time. The challenges to managing diabetes in college that have been suggested by prior studies include stress around developing independence and dealing with peer pressure with respect to eating, body weight, exercise, lack of daily routine and routine sleep, and experimentation with alcohol. The goals of this study were to find more about this population through an online survey. A survey was developed consisting of 60 primary and 14 supplementary questions. Participants were recruited from various networking sites such as Facebook. The questions focused on various hypotheses, which examined the impact on living well with diabetes, of the transition from parental authority to autonomy, of the various disruptive conditions mentioned above, of risk taking behaviors, and of interactions with health care professionals. Statistical analysis methods included Cronbach's Alpha testing, paired t-tests and Spearman's correlations. Managing diabetes in college was perceived to be more difficult than in high school, and quality of life was impeded by diabetes. Several of the factors suggested in previous research were also found to be correlated to perceived difficulty, quality of life, or last HbA1c. No significant correlation was found between these markers of diabetes management and transition to autonomy, risk taking, or prior or current medical team interactions. These data add to our understanding of the challenges of living with diabetes as a college student. A strength of this survey was a large (n=145) response rate, however, this self-selection process resulted in a group of participants who were doing relatively well with their diabetes. Future studies should focus on diabetic college students who have the most difficulty managing their diabetes.

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Introduction and Specific Aims

Type 1 diabetes is a chronic condition in which the pancreas ceases to produce insulin, a hormone necessary for the metabolism of carbohydrates. Unlike type 2 diabetes, in which the patient may produce some insulin, people with type 1 diabetes are unable to produce any insulin at all. Patients with type 1 diabetes must constantly monitor their blood sugars while at the same time administering insulin, at times and in doses based on best estimates of need. This makes type 1 diabetes a challenging condition to live with - a balancing process of multiple factors - food, exercise, and insulin. Living well with diabetes is said to be particularly difficult in college, where adolescents are transitioning into adulthood. They are learning to do things on their own, and this must include managing their diabetes.

While it is often stated that college is a particularly difficult time for diabetes self-management, only a few studies have examined the specifics of living well with diabetes during this time. The challenges to managing diabetes in college that have been suggested by prior studies include stress around developing independence and dealing with peer pressure with respect to eating, body weight, exercise, lack of daily routine and routine sleep, and experimentation with alcohol. Also likely to be a factor are the rebellious and risk-taking attitudes typical of this age group.

On top of these numerous challenges relatively unique to college, the transition to autonomy – of control from parent to the young adult – may also affect how the young adult manages diabetes in college. It has been suggested that if the parent is too controlling in the teen years, the student is more likely to have difficulty managing once they are on their own; that conflict between parent and child worsens the child's ability to take proper care of their health; but conversely that loss of true parental support in the college years may also have adverse effects.

As noted, however, the number of studies that have examined these issues is relatively small, which was the impetus for this study. The specific aims of this study were:

1. To confirm the perceived difficulty of diabetes management in college/university.
2. To confirm poor diabetes outcomes in college/university by comparing current HbA1c values with HbA1c values from adolescence.
3. To determine the quality of life of college/university students with diabetes.
4. To confirm the previously identified factors thought to make the management of diabetes in college/university difficult.
5. To test for a relationship between 'quality' of the transition from parental authority to teen autonomy and diabetes management in college/university.
6. To examine if 'risk taking' and poor diabetes control are related.
7. To test for a relationship between 'quality' of the student's relationship with their physician during adolescence and diabetes management in college/university.

The Hypotheses to be tested were:

1. College/university students with diabetes will perceive a greater level of difficulty in diabetes management than earlier in life.
2. HbA1c values of the college/university students will be higher than when they were adolescents.
3. The quality of life of college/university students with diabetes will be slightly lower than ideal.

4. The factors identified in previous studies for causing difficulty in diabetes management in college/university will again be found to be related to difficulty and poor control.
5. There will be a positive correlation between difficulties in transition to autonomy and difficulties in good diabetes management in college/university.
6. There will be a negative correlation between ‘risk taking’ and diabetes self-care and control among college/university students.
7. There will be a positive correlation between supportive rather than confrontational medical care during adolescence and good diabetes self-management in college/university.

Background and Significance

Type 1 diabetes is one of the most common chronic conditions among children and young adults (1). The ability of the body to produce the hormone insulin and thereby regulate blood sugar is essentially destroyed in patients with type 1 diabetes, so that living well with diabetes necessitates multiple daily injections of insulin and monitoring of treatment success by multiple daily finger sticks for blood sugar checks (2), or more recently continuous subcutaneous glucose monitoring (3). However, more than that, constant consideration about how food, activity and stress affect the body is essential, so that the correct insulin dose for the circumstances of the moment can be selected (2). Thus self-management is important to the prevention of short-term complications, such as hypoglycemia (low blood sugar), and long-term complications, such as blindness and kidney failure (4). Although modern medicine has made living with diabetes possible and even easier, it is still a significant hardship.

The constant balancing of insulin dose against food intake and physical activity is particularly difficult for young adults with diabetes during the transition from relying on parents to independence, as has been highlighted in several papers addressing the late teen period and young adulthood. It has been argued that young adulthood extends through 25 or even 30 years old and that young adults are not / do not see themselves as not yet fully able to accept responsibility for self and make independent decisions (5). Consistent with this point is the well established observation that young adults are much more prone to greater risk taking behaviors – for many complex reasons – than older individuals (6). With respect to diabetes, as adolescents become older, glucose control in general worsens (7) and this appears to also be a problem in young adulthood (reviewed by Weissberg-Benchell J, et al. (5)). Thus, unfortunately, in the 20-29-year age-group type 1 diabetes is associated with increased morbidity and even mortality (8, 9).

Many young adults in this age group attend college or university and this setting poses its own challenges (5). Unfortunately, despite diabetes being a very well studied disease in general, college students with diabetes seem to be a “forgotten group” (1). There are far fewer studies on college students with diabetes compared to children or adults with diabetes. Perhaps young adults are overlooked precisely because they are in a transition from youth to adulthood and from pediatric health care to adult health care (5). In the few studies that have examined these issues many students report difficulty managing diabetes in college (10). What are these difficulties?

Twelve main areas of difficulty emerge from a review of the literature, and these are listed in Table 1:

Table 1	
Reasons for Difficulties	Studies that Identified Reason
1. Diabetes management struggles / inconveniences	(10); (11)
2. Typically unhealthy diet / eating habits of the college lifestyle	(10); (1); (11); (12)
3. Desire to control weight	(1); (12)
4. Disruption to the routine by exercise	(1)
5. Stress	(10); (11); (13)
6. Lack of a routine	(1); (13)
7. Desire to appear normal / peer influence	(10); (8); (14); (11); (12); (13)
8. Alcohol	(10); (14); (12); (13)
9. Lack of access to specialists and self-care supplies (inadequate insurance)	(8); (15); (16); (11)
10. Lack of parental involvement	(1)
11. Tendency of this age group to “rebellion”	(11)
12. Attitude	(4)

As discussed earlier, day-to-day diabetes management is challenging. People with type 1 diabetes must consistently check their blood sugar, consider their circumstances and then administer the appropriate dose of insulin – and there is good evidence that the more times this is done in a day, the better the results (2). However, the college environment is perceived as challenging in this regard. In the study of Ramchandani et al (10) while 88.1% of students reported trying to either maintain or even increase their number of daily injections, as they were advised, this increase in the number of injections was difficult; students must find the time to administer the injection, and some also feel embarrassment when giving injections in front of others. Therefore some students choose to ignore their disease, which leads to more glucose variability, i.e. both acutely unpleasant hypoglycemic episodes and hyperglycemia that leads to long-term damage (11).

Difficulty sticking to a diabetes-appropriate diet is one of the most common challenges to diabetes control in college identified by students (10). Most of the students reported on by Wdowik et al (11) acknowledged they did not stick to the recommended diet. They also did not plan meals or snacks ahead of time. The residence hall environment, Greek living, and limited time to plan meals all added to the difficulty of meal planning, yet the more planned / stable meals are, the easier it is to achieve glucose control (2).

Weight management goals, particularly among college women with diabetes, also tend to confound diabetes self-care. The desirable stability of the diabetic diet is incompatible with episodic food restriction to control weight. More specifically steady consumption of carbohydrates to maintain steady glucose levels is recommended, while many weight-loss diets limit the consumption of this macronutrient. Balfe (1) stated when discussing one of his study participants: *“Carbohydrate consumption was ‘decent’ because it provided her with a way to regulate her diabetes. However, while this consumption was good in terms of blood sugar control, it was bad in terms of Maria’s weight management practices, which themselves were strongly linked to self-discipline and moral control of self.”* In addition to making diabetes control challenging, the constant struggle between eating to control diabetes and eating to control weight can wear the student down in college, where planning meals is more difficult.

While women are more concerned about weight loss and thinness, men tend to have different concerns. As one of Balfe's (1) study participants stated, *"My fitness goals are not to lose weight. They're to gain stamina and to gain strength. Basically, it's not to lose weight"*. So while weight gain may occur among male college students, the weight gain is not considered negative in itself. Male students instead consider the type of gain to be important. Undisciplined flab has many negative connotations, while weight gain due to muscle mass is considered a positive accomplishment.

No matter whether the goal is to lose weight or gain muscle, exercise is involved, and that can complicate diabetes management as well. It is healthy to exercise and exercise can be used to help manage body weight. Furthermore physical activity is a natural part of the college campus. However, for the patient with type 1 diabetes, exercise is a disruption to the routine, and therefore a disruption to glucose control. Physical exertion can cause hypoglycemia in diabetic patients. This can make maintaining an exercise program problematic. Type 1 diabetic patients may have to eat before or after exercising, sometimes consuming more calories than they burned. Frustration results when the exercise does not result in any weight loss. One of Balfe's (1) study participants stated, *"If you exercise then there's more chance of you having a hypo and then you... eating or drinking or having extra stuff because you're hypoing. So why do the exercise in the first place?"* Many college students share this frustration, and eventually give up on exercising altogether.

The college environment can be very stressful. In the study of Ramchandani et al (10) students reported a high level of stress in college. Stress is well recognized to adversely impact glucose control (2) through at least three mechanisms – disruption of the routines of self-care, release of stress hormones which physiologically increase glucose levels and the tendency to eat more when under stresses (11).

College students also lack a stable routine, which runs counter to the desirable routine of diabetes management. Another of Balfe's study participants stated, *"A lot of diabetes is about routine. It's about getting up in the morning at the same time, ...as a student your sense of routine is out the window"* (1); so sometimes diabetes management takes the back seat as the student tries to keep up with the chaos of college life.

The adolescent college population is known for their desire to fit in with their peer group and not be different. This factor also tends to negatively affect diabetes management in college (10), leading to students avoiding checking blood sugar in public or giving insulin injections. Also, one way to avoid hypoglycemia, for instance during exercise, is to allow the blood glucose to run high. Fortunately, sometimes peers can be helpful to the student with diabetes, who may benefit from confiding to a reliable friend about their condition, so they can help if potential problems arise (8).

Alcohol abuse is a well-known characteristic of the college life. It can be a very dangerous substance for anyone who abuses it, but it is particularly problematic for students with diabetes. Several hours after consumption of alcohol the blood sugar levels of a diabetic patient begin to drop. This is due to the alcohol's tendency to counteract the liver's production of glucose (2). The problem can be confounded by the fact that alcohol intoxication and hypoglycemia may appear very similar to an untrained observer, and that even the patient may not easily differentiate the two. Thus – patients may choose to keep their blood sugar high during alcohol consumption, with its associated long-term risks.

Hagan and Janas (14) explored issues around alcohol consumption among college student with diabetes in some detail and confirmed that for many students drinking alcohol is one of the main social activities in college.

Three strategies were employed by college students with diabetes to cope with problems of alcohol consumption specific to diabetes. Some chose to avoid drinking altogether. They would either avoid the alcohol scene, or attend parties and refrain from alcohol. A second group of students were experimenting with alcohol. They would try drinking alcohol with trusted friends to see how it would affect them. Finally, a third group of students labeled themselves as drinking alcohol with limits. They placed limits on themselves, but they regularly joined in social alcohol consumption (14). Although students with diabetes tend to deal with the pressures of drinking differently, they all agree that peer pressure is a big part of the problem. Hagan and Janas (14) state that *“Students also perceived that peer pressure to drink was strong at this university, and that this created a substantial obstacle for diabetes management.”*

In the study of Hagan and Janas (14), no student identified themselves as excessive alcohol drinkers. The probability of no college students with diabetes actually consuming alcohol to excess seems low due to the fact that college is known for binge drinking. This observation is therefore much more likely due to selection or reporting biases, a common major problem for all the studies dealing with life of diabetic college students.

One important asset students with diabetes may lack when they move to college is access to a specialist. Strachan et al (8) identified this by stating, *“...students become divorced from the ... local diabetes specialist centre and initially may not have similar contact and immediate access to medical or nursing advice on their diabetes, precisely at the time it may be most needed...”*. Without a specialist, they do not have a knowledgeable person to go to when experiencing difficulty with insulin regimen or high blood glucose levels. Surely the on campus health center can help some, but not to the extent a student with diabetes may need. For many students, at least in the U.S.A., transition to college may also be a time of transition to inadequate health care insurance (11).

Another important source of support for diabetes management that may be lost or that at least becomes more distant on moving to college is support from parents. While for some students their relationship with their parents may adversely affect diabetes (13), for others it is an important source of support. The broader issue of transition of authority and responsibility around diabetes when the patient is a teenager and how this may potentially be relevant to diabetes self-care and outcomes in college will be discussed in more detail later.

Finally, one’s attitude can significantly impact how someone will approach the challenges of living with diabetes. Using the Expanded Health Belief Model as a framework, Wdowik et al (4) examined how various attitudes among students are related to their diabetes management. The attitude constructs that were most predictive of healthy diabetes management behaviors were intention to take care of self and importance of health. The more intent the student was on being healthy and taking care of her/himself, the more likely she/he was to follow healthy practices. On the other hand, barriers to achieving the appropriate outcomes identified were - situational factors and having a negative emotional response. So the more obstacles that get in the way of ideal diabetes management and the more negative the feelings a student has about living with and taking care of diabetes, the more likely the student will struggle.

The research reviewed so far provides some insight into the situational as well as psychosocial factors that are particular challenges to diabetes self-care among college students. In addition it does appear that “poor” diabetes results in adolescent years predict “poor” results among young adults (17-20), and therefore factors affecting self-care in the mid teen years will next be examined.

Top among these appear to be psychological factors (21). Psychiatric disorders including depression and eating disorders are more common in children and adolescents with type 1 diabetes than in their non-diabetic peers, and these are associated with worse metabolic control, as are other forms of stress, including diabetes specific stress (22). Poor control is also associated with maladaptive coping and low self-efficacy. Further, beliefs about diabetes are important with stronger beliefs about the seriousness of diabetes, personal vulnerability to complications, costs of regimen non-adherence, and the efficacy of treatment being associated with better outcomes. Intervention studies – most often focused on the family unit – also support the importance of psychosocial factors in diabetes outcomes in youths; positive interventions include goal setting, positive reinforcement, behavioral contracts, supportive parental communications, and appropriately shared responsibility for diabetes management. Positive outcomes are not limited to just glycemic control but also to parent-adolescent relationship and family conflict.

In fact the parents-child relationship seems to be central to diabetes outcomes in childhood (21, 23). For instance a recently published study by Helgeson, Siminerio et al (7) examined metabolic control over four years in a group of boys and girls who were 12 years old at the start of the study, and found that eating disorders, depression, peer relations and family relations were all salient factors, and Luyckx and Seiffge-Krenke (24) recently reported that family climate and self-concept remained associated with glucose control into early adulthood (ages 21-25 years).

Many aspects of the parents-child relationship appear to be important (21, 23, 25) and there are many ways in which a parent can approach aiding their child in managing their diabetes. Not surprisingly conflict is not helpful. Thus Duke Geffken et al. (26) noted that youth who reported more critical parenting (about diabetes management) had worse metabolic control. Typical characteristics of critical parenting include nagging, constantly arguing with the child over injections and blood sugar checks, and getting angry when blood sugars are not ideal, etc. However, this was a cross sectional study, making assignment of cause and effect difficult. In this same study youth externalizing behaviors (aggressive, hyperactive, noncompliant, and under controlled) were also associated with poor control and critical parenting. Similarly Leonard, Garwick et al. (27) observed that teens 14-16 years old who had good metabolic control described their parents’ monitoring roles more positively, whereas teens with worse control were annoyed with reminders and described more conflict with their parents related to lack of adherence to their diabetes protocol.

Also Helgeson, Reynolds et al (28) observed in a similar age group that shared responsibility for diabetes care was consistently associated with better psychological health, self-care behavior, and metabolic control than when responsibility was mostly resting with parents or the teenager.

And last Cameron, Skinner et al. (29) found that among patients and families in 21 centers in 19 countries family factors, particularly dynamic and communication factors such as parental over-involvement and adolescent-parent concordance on responsibility for diabetes care appeared to be important determinants of metabolic outcomes in adolescents with diabetes.

Eventually responsibility must be transferred to the youth, but how this is done also appears to be important. In a qualitative study of 32 teenagers ages 13-17 Karlsson, Arman et al. (30) concluded that “*in striving for autonomy, teenagers needed distance from others, but still to retain the support of others*”. The time for this shift will however vary between individuals. Thus in one study adolescents with lower maturity levels – regardless of chronological age – were less likely to accept responsibility for insulin adjustments, despite their parents’ intentions (23).

The personality of the parent and the adolescent can also affect their approaches to diabetes management, and outcomes. Vollrath, Landolt et al. (31) studied associations between the child’s metabolic control and the children’s and their parents’ personalities using the Big Five personality domains. They found that children high in agreeableness, high in conscientiousness and low in neuroticism had lower blood sugars on average. These same characteristics in the mother of the child also correlated to lower blood sugars in the child.

Returning to college students with diabetes, is this at risk population usually supported by appropriate services? As already alluded to earlier, this is not usually the case (8, 15) though transition care for young adults with diabetes is at least being considered in the community at large (5, 32) and there have been some apparently highly successful attempts to provide such care (5, 16).

To summarize, much is still unknown about young adults living with type 1 diabetes as college students. Factors from their high school years, as well as the various challenges unique to college life and to this point in human development, all have the potential to affect their diabetes self-management. Therefore the goals of this study were to find more about this population through an online survey. The hope was to confirm the following hypotheses:

1. College/university students with diabetes will perceive a greater level of difficulty in diabetes management than earlier in life.
2. HbA1c values of the college/university students will be higher than when they were adolescents.
3. The quality of life of college/university students with diabetes will be slightly lower than ideal.
4. The factors identified in previous studies for causing difficulty in diabetes management in college/university will again be found to be related to difficulty and poor control.
5. There will be a positive correlation between difficulties in transition to autonomy and difficulties in good diabetes management in college/university.
6. There will be a negative correlation between ‘risk taking’ and diabetes self-care and control among college/university students.
7. There will be a positive correlation between supportive rather than confrontational medical care during adolescence and good diabetes self-management in college/university.

Methods:

The research questions were examined using a convenience sample on-line survey of college and university students living with type 1 diabetes. The study was reviewed and approved by the Institutional Review Board of the Pennsylvania State University.

Participants/Recruitment

Invitation to participate in the survey was posted for student groups on different networking sites that identify with diabetes (e.g. Facebook). A request to “pass it on” was part of all invitations. University Health Services also distributed similar invitations to a list of students at Penn State self-identified as having type 1 diabetes (the investigators did not have access to identifying information). All college students that were at least 18 years of age with type 1 diabetes were welcome and encouraged to participate in the survey.

Instrument Development

The survey consisted of 60 primary and 14 supplementary questions. Participants were encouraged to answer the 60 questions of primary interest to the study, and go on to the supplementary less central questions if willing. This division of the survey into primary and supplementary was intended to promote participation.

Questions were developed in several ways (Table 2). Previously validated and published scales or subscales were used, where available. Other question sets were developed based on the findings of previous studies. Where no published scales or guiding previous publications were available, questions were developed *de novo* based on the experiences of the investigators (one as a college student with type-1 diabetes and the other as an endocrinologist treating students with diabetes for over 20 years).

Topic	# of ?s¹	Scale or sub-scale	Reference
Demographics, including diabetes history	6	NA	NA
Self-Care	6	Diabetes Self-Care Questionnaire – modified by the investigators	(33)
Self-Care	4	Questions Developed by Current Researchers	NA
Risk Taking Behaviors	11	Questions developed by researchers	based on advice from Robert Turrisi ²
Specific difficulty in college	3	Questions Developed by Current Researchers	NA
Control worse than earlier	4	Questions Developed by Current Researchers	NA
QoL in college	2	Questions Developed by Current Researchers	NA

¹ Some questions apply to more than one construct, so that some questions are listed in the table more than once and total number of questions in the table is more than the actual number of questions asked.

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Transition from parental control to autonomy	6	Questions Developed by Current Researchers	NA
Medical care style teen years	8	Questions Developed by Current Researchers	NA
Diabetes management struggles / inconveniences	1	Questions Developed based on Previous Findings	(10); (11)
Typically unhealthy diet / eating habits of the college lifestyle	2	Questions Developed based on Previous Findings	(10); (1); (11); (12)
Desire to control weight	1	Questions Developed based on Previous Findings	(1); (12)
Disruption to the routine by exercise	1	Questions Developed based on Previous Findings	(1)
Stress	3	Questions Developed based on Previous Findings	(10); (11); (13)
Lack of a routine	2	Questions Developed based on Previous Findings	(1); (13)
Desire to appear normal / peer influence	2	Questions Developed based on Previous Findings	(10); (8); (14); (11); (12); (13)
Alcohol	3	Questions Developed based on Previous Findings	(10); (14); (12); (13)
Lack of access to specialists and self-care supplies (inadequate insurance)	5	Questions Developed based on Previous Findings	(8); (15); (16); (11)
Lack of parental involvement	2	Questions Developed based on Previous Findings	(12)
Attitude	4	Questions from the Diabetes College/University Scale	(4)

The full question set and possible answers are provided as appendix A. Participants were invited to skip questions they did not feel comfortable answering. For most the answer options were linear likert-type scales. The answers to a few of the questions were structured so that the middle answer was the ideal, with either end being a negative extreme (e.g. My parents were involved in my diabetes management when I was 14-18 years old: 1. Far not enough, 2. Not enough, 3. Just right, 4. Too much, 5. Far too much). In these cases, for the purposes of the correlation analyses, scores were converted to a linear scale by keeping response 3 as ‘best’ and combining responses 1+5 into ‘worst’ and 2+4 as ‘middle’.

The questions that were newly developed for this research went through several tests and edits. Cognitive interviews were conducted with university students with type 1 diabetes reading the questions out aloud and explaining to the investigator how they perceived the questions. A group of about ten test subjects also piloted the full survey to test for any inconsistencies or confusion. The commercial survey tool www.surveymonkey.com was used as the survey mechanism.

Data Analysis

All of the statistical analysis was performed using SPSS (Statistical Package for the Social Sciences) software. The significance level for all statistical tests was $p\text{-value}=0.05$.

Cronbach's Alpha

Cronbach's Alpha is a coefficient of reliability, which assesses how well a set of variables measures an underlying construct. Cronbach's Alpha will usually be low if data have a multidimensional structure. In most social science research, a value of 0.7 or higher is considered "acceptable" (34). Cronbach's Alpha was computed using SPSS for 3 groups of question sets to determine if the question sets truly fit well together. These were the first four questions relating to the transition from parental control to autonomy, all of the risk taking questions, and the first seven questions related to health care during the pre-college years.

Paired t-test

Paired t-tests were performed using SPSS to assess difference in difficulty in diabetes management and in stress level between college/university and earlier in life, difference in HbA1c values between college/university students and adolescents, and difference in the quality of life of college/university students between reality and ideal. The paired t-test was used because values that were compared were obtained from the same subject in different situations.

Spearman correlations

Spearman correlations were used to test for association between several variables representing living (well or not) with diabetes – difficulty in diabetes management, detriment in quality of life of college/university students due to diabetes and HbA1c, and multiple potential determinants of these diabetes-related outcomes/states. The Spearman correlation coefficient indicates the direction and magnitude of association between two ranked variables.

Results:

Sample

There was a very large response within the first several days of the study being open, with daily responses decreasing rapidly after that despite reminder "posting". Thus 193 (69%) of the total 279 responses were collected in the first 7 days. Of the total 279 subjects who responded in the 8 weeks that the survey was open, 10 were eliminated from analysis for their age being 17 years or younger (IRB approval required all participants to be 18 and older), 5 because they did not provide age at diagnosis, 9 for mostly missing data, and 1 for not taking insulin (not typical for people with type 1 diabetes). This left 254 subjects with evaluable data.

In line with the hypotheses of this study – hypotheses focusing on those experiencing the challenges of life with diabetes as young adults in college – selected for this report were only the respondents

who also met the following criteria: undergraduates in years 1-4 of university (74 excluded); age 18-24 (30 more excluded for being older); had been diagnosed with diabetes at least one year (4 more excluded). This resulted in 146 subjects in whom hypotheses about current life with diabetes could be examined. For the hypotheses comparing current life with diabetes to the high school years, the sample was further reduced to the “early onset” group, which included all subjects with an age of diagnosis with diabetes equal to or younger than 14 years old. This early “onset group” was thus composed of 130 participants.

Demographics

Personal and diabetes-related demographic information is provided in Table 3.

Variable	Mean±SD or %
Age (years)	19.7±1.4
Females	76%
From USA ³	86%
Year in college	2.3±1.1
Average age at diagnosis of diabetes (years)	9.1±4.5
Duration of diabetes (years)	10.6±4.6
Insulin pump (others used injections)	70%
≤3 Injections / typical day (among injection users)	95%
Take insulin exactly as prescribed every of last 7 day	47%
% Any daily glucose testing, on average	93%
% At least 3-4 glucose tests / day, on average	70%
% At least 5-6 glucose tests / day, on average	40%
Continuous glucose monitor use on most days	14%
Test blood sugar exactly as prescribed every of last 7 days	30%
Think about what is affecting blood sugar at least once every of last 7 days	56%
See diabetes specialist at least every 6 months	87%
Health care and supplies mostly paid for by a third party (such as health insurance)	95%

Last HbA1c	
<6% (40 mmol/mol)	4%
6-8% (40-65 mmol/mol)	53%
8-10% (65-85 mmol/mol)	32%
>10% (85 mmol/mol)	8%
Cannot remember	3%

Due to the nature of this survey study, no direct biological measurements were made; rather information about diabetes control (as HbA1c) was provided by participants based on their recall. Of the respondents 61% stated that they had a HbA1c measured within the last 3 months and 86% within 6 months. Values for the last HbA1c as best recalled are given in table 4.

³ Canada (7), UK (5), Australia (3), Greece (2), South Africa (1), New Zealand (1), Saudi Arabia (1), Guatemala (1)

Living Well with Diabetes in College

The underlying goal of this research was to better understand the experience of living with diabetes as a college student. Answers to some of the key questions in this regard are given in table 5.

Variable	Mean±SD	p-value⁴
Quality of Life Now (scale 0-10; n ⁵ =143)	7.0±1.7	p<0.0001
What would QoL be without diabetes? (scale 0-10; n=143)	8.3±1.7	
QoL now 0-1	0%	
QoL now 2-5	18%	
QoL 2-5 without diabetes	7%	
QoL would be WORSE without diabetes	6%	
QoL would be BETTER without diabetes	69%	
QoL would be at least 2 points BETTER without diabetes	41%	
QoL would be at least 3 points BETTER without diabetes	14%	
Inconvenienced by diabetes on last 7 days – NOT AT ALL	9%	
Inconvenienced by diabetes on last 7 days – EVERY DAY	56%	
Stress level now (scale 1-5; n=131)	3.8±0.9	
Stress level interfere with diabetes (scale 1-5; n=130)	3.0±1.3	
Lack of routine now (scale 1-5; n=131)	2.9±1.2	
Lack of routine interfere with diabetes (scale 1-5; n=130)	2.9±1.3	
Disclose diabetes to another within 2 weeks of meeting	44%	
Disclose diabetes to another only after a year or more	3%	
Might hide diabetes to fit in	21%	
Unhappy because of diabetes, agree or strongly agree	25%	
Diabetes controls me, agree or strongly agree	29%	
Diabetes is stressful, agree or strongly agree	75%	

Comparing the College Experience to Earlier

To explore whether living with diabetes in college is “more difficult”, several of the questions asked the students to compare living with diabetes to “when you were 14-18 years old, i.e. before university”. The responses in table 6 are from among the 130 students who were diagnosed before the age of 14 (i.e. the “early onset” group).

Variable		14-18 yo	Now	Delta	p-value⁶
Typical HbA1c (n ⁷ =118)	<6% (40 mmol/mol)	4%	3%	Within subjects 24% reported improvement,	
	6-8% (40-65 mmol/mol)	54%	53%		

⁴ Paired t-test.

⁵ n = number answering the question.

⁶ Paired t-test.

⁷ n = number who provided estimate for both now & earlier.

	8-10% (65-85 mmol/mol)	33%	36%	50% no change, 26% worsening (NS).	
	>10% (85 mmol/mol)	9%	8%		
Difficulty Managing Diabetes (scale 0-10; n=128)	5.4±2.1	6.5±2.3	-1.1±2.3	P<0.000	
Stress Level (scale 1-5; n=129)	2.6±1.0	3.8±0.9	-1.1±1.3	P<0.000	

Possible Determinants of Living Well with Diabetes in College

The most commonly used measure of living well with diabetes is the HbA1c – a measure of glucose control – and the most recent recalled HbA1c was selected as one of the dependent variables representing living well with diabetes currently. The difference between quality of life (QoL) now (0-10 scale) and what it would be like without diabetes was selected as another dependent variable, to provide a more global measure of life with diabetes; the computation was QoL actual – QoL without diabetes, so that a larger negative number represents a greater perceived deficit in QoL. Difficulty managing diabetes currently in college (0-10 scale) was examined both as a measure of living well with diabetes (dependent variable) and as an independent variable in relation to HbA1c and DM-QoL.

Self-care

Diabetes outcomes are in most studies related to self-care, and the results for the relevant analyses in this study are provided in table 7.

	Current Difficulty Managing Diabetes	Diabetes Related Quality of Life	Last HbA1c
Check Blood Sugar as Recommended Days/Week	-0.179 (p<0.05)	No Correlation	-0.327 (p<0.01)
Take Insulin as Recommended Days/Week	-0.269 (p<0.01)	0.351 (p<0.01)	-0.205 (p<0.05)
# of Blood Sugar Checks	No Correlation	No Correlation	-0.279 (p<0.01)

Factors Identified from Previous Research

A number of questions were asked about the previously identified possible barriers to good diabetes outcomes (see Table 1), to explore quantitatively whether the dependent variables were related to these putative barriers. Each individual question represented one of twelve identified factors from previous research (see Table 1), and in some cases several questions were asked. Answers to these questions were then correlated with the three indicators of living well with diabetes. Tables 8-13 provide these results (results for questions found to have no significant relationship with diabetes outcomes are not given). Indicators of living well with diabetes were not found to be related to any of the answers about exercise, peer pressure, attitude, and availability of specialist health care and health insurance. Alcohol, risk taking, transfer of authority from parents, and relationship of the adolescent with healthcare providers in the pre-college period are all addressed in separate sections later.

Table 8: Inconvenience / Difficulty			
	Current Difficulty Managing Diabetes	Diabetes Related Quality of Life	Last HbA1c
Inconvenienced by Living with Diabetes Days/Week	0.520 (p<0.01)	-0.475 (p<0.01)	No Correlation
Difficult Managing Diabetes	Same Question	No Correlation	0.360 (p<0.01)

Table 9: Eating Habits			
	Difficulty Managing Diabetes	Diabetes Related Quality of Life	Last HbA1c
Healthy Eating Days/Week	-0.252 (p<0.01)	No Correlation	-0.219 (p<0.05)
Fast Food Days/Week	0.195 (p<0.05)	No Correlation	No Correlation
Meals/Day	No Correlation	0.247 (p<0.01)	No Correlation

Table 10: Desire to Control Weight			
	Difficulty Managing Diabetes	Diabetes Related Quality of Life	Last HbA1c
Happy with Weight	No Correlation	0.232 (p<0.01)	-0.216 (p<0.05)

Table 11: Stress			
	Difficulty Managing Diabetes	Diabetes Related Quality of Life	Last HbA1c
Stress Level at University	0.335 (p<0.01)	-0.319 (p<0.01)	No Correlation
Stress Interferes with Diabetes Care	0.506 (p<0.01)	-0.325 (p<0.01)	0.235 (p<0.01)

Table 12: Lack of Routine			
	Difficulty Managing Diabetes	Diabetes Related Quality of Life	Last HbA1c
Chaos Level at University	0.294 (p<0.01)	No Correlation	0.267 (p<0.01)
Chaos Interferes with Diabetes Care	0.438 (p<0.01)	-0.346 (p<0.01)	0.210 (p<0.05)

Table 13: Parental Involvement			
	Difficulty Managing Diabetes	Diabetes Related Quality of Life	Last HbA1c
Parental Involvement with Diabetes Care in University	-0.180 (p<0.05)	0.256 (p<0.01)	No Correlation

Transition from Parental Control to Autonomy

Table 14	
Transition Issue	Mean±SD
Parents Involved	3.0±0.7
Parents Protective	3.3±0.8
Parents Worrying	3.5±0.8
Responsibility Shared with Teen	3.0±0.8
Communication	3.6±1.1

Four questions were developed to assess the ‘quality’ of transition of diabetes care from parents to autonomy during the pre-college years. The questions asked about parents being involved, protective, worried and giving responsibility. The answer options were “far not enough”, “not enough”, “just right”, “too much” and “far too much”. As discussed previously, the extreme answers

and the medium answers were each summed resulting in a 3-point scale. These four questions were used together as a single “Transfer from parental authority to autonomy” scale with a Cronbach’s Alpha of 0.668. Another question asked about the quality of parent-teen communication in the pre-college years and this was used in the analyses separately. No statistically significance relationships were found between these parent-teen relationship questions and living well with diabetes in college (difficulty, last HbA1c, or Quality of Life). As is apparent from table 14 (where the results are given reflecting the full 5 point scale), the answers to the questions in this category were centered on the mid-answer with relatively small deviation from the mean.

Tendency to Risk Taking

Table 14	
Risk Taking Behavior	Mean±SD
Gotten Drunk	2.6±1.6
Used Hard Drugs	1.1±0.4
Smoked Cigarettes	1.7±1.4
Sex without Birth Control	1.4±1.1
Sex without Condoms	1.8±1.4
Been in a Physical Fight	1.1±0.2
Stolen Something	1.1±0.4
Vandalized Something	1.0±0.2
Rowdy at a Party	1.3±0.7
Trouble with University	1.0±0.2
Trouble with Police	1.0±0.2

Eleven questions addressed risk taking during college years. Each question asked how many times in the last 3 months had the student participated in risky behavior, such as getting drunk, using hard drugs, etc. The average answers on a scale of 1 = Never to 5 = 7 or more times are given in Table 14 – as is apparent the majority of these students did not engage in risky behaviors other than alcohol use, smoking and sexual activity related risks. The 11 questions provided a reasonable single scale (Cronbach’s Alpha was 0.549). No statistically significant relationships were found between risk taking and living well

with diabetes in college (difficulty, last HbA1c, or Quality of Life). The more commonly observed individual results for getting drunk or smoking cigarettes were also tested but also were not correlated with living well with diabetes in college (difficulty, last HbA1c, or Quality of Life).

Medical Care in Late Teen Years

Table 15	
Medical Care	Mean±SD
MD Did Not Listen	3.6±1.3
MD Told Pt What to Do	3.6±1.3
MD Collaborated	3.6±1.1
MD Got Angry	3.5±1.3
Pt liked seeing MD	2.4±1.3
MD Supportive	3.5±1.1
MD Prepared Pt for University	2.8±1.3

Seven questions were developed to examine if a supportive rather than confrontational style of medical care during teen years would aid young people in living well with diabetes in college. These 7 questions appeared to provide a single scale (Cronbach's Alpha was 0.917). Results for this scale are given in Table 15. A higher score denoted for these answers better more collaborative and patient-centric care, with the scale being 1 – 5. Thus these students recalled their

care as better than average (3), however with reasonable spread (all SD>1). No statistically significant relationships were found between physician interaction style during pre-college years and living well with diabetes in college (difficulty, last HbA1c, or Quality of Life).

Discussion:

The main questions explored in this study were: 1) Is managing diabetes in college more difficult than earlier in life? And 2) which factors make it difficult? The students who took part in this survey definitely perceived that diabetes management was more difficult in college; however, their self-reported recalled HbA1c values (glucose control) did not reflect this. Despite feeling that managing diabetes in college is more difficult, the majority of students were still able to maintain the same level of control they achieved while in high school – based on their recall.

Despite the fact that many of the subjects were managing their diabetes reasonably well (56% reported HbA1c <8%), many (69%) felt like their quality of life would be better if they did not have diabetes. A majority of the subjects also felt inconvenienced by their diabetes everyday (56%).

Perceived difficulty taking care of diabetes was related to stress (and stress interfering with diabetes care), lack of routine (and lack of routine interfering with diabetes care) and lack of parental support. Recommended blood sugar testing, recommended use of insulin and healthy eating were inversely correlated with perceived difficulty and can perhaps be thought of as specific behaviors embodying the more abstract “difficulty”.

As might be expected, HbA1c was positively correlated with perceived difficulty. Higher HbA1c (i.e. poor glucose control) was also related to less testing, less correct use of insulin, less healthy eating, lack of routine and more stress. HbA1c was not related to parental support but was related to dissatisfaction with body weight.

Diabetes related quality of life (DM-QoL) was positively related with being content with body weight, with parental support and with some aspects of engaging in good self-care – eating meals and taking insulin as recommended. It was negatively correlated with stress and with the perception that stress and lack of routine interfere with diabetes care.

The data are therefore consistent with the hypotheses that stress, lack of routine and inadequate parental support contribute to difficulty taking care of diabetes in college, with this difficulty

translating to worse self-care and worse glucose control. Concerns about body weight were not linked to perceived difficulty, but were linked to glucose control suggesting that those happy with their weight are less likely to consciously or subconsciously manipulate their insulin to lose weight, as has been shown before (19, 35). DM-QoL appears to be broadly speaking linked to the same factors – i.e. stress, lack of routine, concerns about body weight and inadequate parental support.

These findings confirm the results of several previous studies. Ramchandani et al (10) found that college students with diabetes believe management of diabetes to be more difficult in college compared to high school, yet their glucose control was, as in this study, no worse (based on actual measured values). The students interviewed by Wdowik et al (11) felt inconvenienced by their condition and named many barriers to managing diabetes in college. Ramachandi et al, Wdowik et al, as well as Balfe (1, 12, 13) collectively found relationships between diabetes difficulties and: poor eating habits and other self-care (e.g. glucose testing); increased responsibility / lack of parental involvement in college; and concerns about weight / eating disorders.

These same researchers also noted the negative relationships between stress and lack of routine, and diabetes management in college, though these student reports were not assessed quantitatively in these prior studies.

The present study has expanded on previous findings by examining specifically correlates of current HbA1c, and by also focusing directly on DM-QoL.

Other factors such as exercise, peer pressure, beliefs and attitudes, and availability of specialist health care and health insurance were not found to have any correlation to perceived difficulty, HbA1c, or DM-QoL in this study, which does not fit with previous studies (1, 8, 10-14). Perhaps exercise did not appear to affect the sample in this study because two very simple questions were asked. One about the number of days per week participants exercised at least 30 minutes, and the number of days they exercised in general. Studies such as Balfe's (1) went into much more detail, asking questions such as what motivated the students to exercise, and how they felt it affected their blood sugars. The majority of the questions developed about peer pressure were simple yes or no questions, making it difficult to find a strong correlation. Despite the attitude questions being directly from Wdowik's study (4), no correlation was found with difficulty managing diabetes, DM-QoL or HbA1c in this study. Perhaps this sample simply did not convey a negative attitude towards their diabetes like some of their peers. With respect to healthcare, the vast majority of the participants in this study had health insurance and access to medical care, so perhaps those without would be the ones affected.

None of the new barriers/factors hypothesized to affect living well with diabetes in college were supported by the results of this study. Transition to autonomy, supportive medical care in high school, and risk taking behaviors in college did not have any correlation with HbA1c, perceived difficulty, or DM-QoL.

The failure to find a relationship between the 'quality' of transition from parental authority to autonomy during the high school years and living well with diabetes in college is not consistent with the many studies relating glucose control during adolescence and family relationships (7, 21, 23-30). Possible explanations – other than that such a relationship really does not exist – may be the relative homogeneity of this study sample on the transfer of authority to autonomy questions, or the possibility that the questions that were developed for this study do not adequately assess these issues.

Answers to the questions about health care during high school years demonstrated good variability, but the answers again did not correlate with any aspects of living well with diabetes in college. A possible explanation is that ‘quality’ of the health care in teen years does indeed not impact how the young adult does in college. No prior studies exploring this issue were found.

The vast majority of the subjects did not partake in any sort of risk taking behaviors, other than getting drunk – and this was not correlated with glucose control, difficulty managing diabetes or DM-QoL. This is actually consistent with the findings of both Wdowik et al (11) and Miller-Hagan et al (14) who noted that college students develop strategies for dealing with drinking alcohol. In the study of Ramchandani et al (10) alcohol was, however, found to contribute to difficulties.

When looking at the demographics of the sample, several points emerge. First, 76% of the sample was female. This may speak to the fact that college women may be more willing to take time to answer a survey, or that they are more likely to be members of the various Facebook groups that identify themselves as having diabetes. This could also be compared to studies that have found that men are more likely to take part in risk taking behaviors compared to women, some of which may have to do with the differences in body type desired by men and women (1) (12). Men were also found to be more likely to go to private spaces to check their blood sugars to retain their identify as a normal man (13). However, Wdowik et al did not find any significant correlation when comparing gender to behaviors or attitudes. Wdowik also did not find a correlation with duration of diabetes, with a mean of 11.8 ± 6.9 years (4). This is close to our findings, with the mean duration of diabetes being 10.6 ± 4.6 years.

Another characteristic to note about the sample is that they tended to have a relatively long duration of diabetes, and were attempting to take good care of themselves. Thus 70% were on insulin pumps, while the rest were using intensive insulin injection therapy (95% of the non-pump users were on ≥ 3 injections / day), which is reflected in the majority of their HbA1c levels being $\leq 8\%$ (57%). Despite of these efforts, however, 40% of the participants did have their HbA1c level $> 8\%$ (3% did not know the value), highlighting how difficult it is to control type 1 diabetes.

It is also interesting to note the high response rate to the online survey, and that within the first few days of the survey being open. This speaks to the power of the internet and social networking to connect with people all over the world – an approach that may prove beneficial in conducting other survey studies, particularly among college students.

Limitations:

In conducting a survey online and contacting subjects through various internet resources (email, Facebook) there was no way to avoid probably significant self-selection bias. While the true population characteristics of college students living with diabetes are largely unknown, it is unlikely that 70% are pump users and that their HbA1c modal range is 6-8%. Only 8% of the sample in this study had an HbA1c $> 10\%$ and only 3% could not even remember their last HbA1c. Thus many of the subjects in this study were those who took proper care of their diabetes, while those students who struggle the most were likely under-represented. This could also explain why many of my hypotheses were not supported. Another issue is the fact that the HbA1c was based on recall and was not measured, and that the recalled values were categorical rather than continuous. Finally, the analyses to date are all individual correlations and not yet a full regression model.

Future Directions:

In future studies it would be ideal to find a way to lessen the selection bias, and engage more subjects who are struggling the most with the management of their diabetes in college. More broad-based recruiting through various specialists' offices, hospital emergency rooms, prospectively through pediatric diabetes practices, etc. could be tried.

In assessing the results, many questions are still left unanswered. It is possible that despite of the cognitive interviewing that was done before the survey was launched, some of the newly developed questions were not clear. Also, to avoid subject fatigue, many of the putative barriers to living well with diabetes were only represented by one or two questions. Thus, for instance, asking more in depth questions about the motivations behind exercise and its effect on blood sugar control might have resulted in these results matching those of other studies. The same concept could be applied to the peer pressure questions.

Also, despite the convenience of surveys, interacting with subjects on an individual basis could lead to more nuanced results. In looking at the transition to autonomy, conceivably the parents could also be surveyed to determine if the opinions of the parent-child relationship are mutual. This might validate the questions developed.

Finally, in a cross-sectional study there is no way to determine the causality of the relationship. Thus the results of this study are only consistent with, but do not prove the hypothesized relationships.

Conclusions:

Although there was not a significant increase in HbA1c when students with diabetes transitioned to college, there was an increase in the perceived difficulty of managing diabetes. The main factors that contributed to this were stress, lack of routine, and inconvenience, all of which are a normal part of college life. Stress management skills developed before college could potentially aid in the transition to college life, as could an on-campus program. Also, better self-care proved to positively related to diabetes outcomes, and so those who live a healthier lifestyle are better able to manage their diabetes.

Being content with one's body weight also appears to be a factor in the quality of life and HbA1c values of college students with diabetes. Healthy body image could aid in the prevention of the manipulation of food, insulin, or blood sugars in an attempt to lose weight.

Finally, although the hypotheses about parental involvement, risk taking, and medical care did not show significant correlations, it does appear that if the parent is more involved in college, the student will perceive less difficulty and a higher quality of life. Parents should be willing to offer the support their child needs, if need be.

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Appendix A:

Order of Questions on Survey Monkey:

First Page of Questions:

1. Age
A: 17 years or younger, 18 years old, 19 years old, 20 years old, 21 years old, 22 years old, 23 years old, 24 years old, 25 years and older
2. Sex
A: Male, Female
3. Year in college/university
A: 1, 2, 3, 4, 5 or more, Graduate student
4. Age of Diagnosis
A: Enter in answer
5. What country?
A: Enter in answer
6. Insulin pump or injections?
A: Insulin pump, Injections, I do not take insulin

Second Page of Questions:

7. On a Scale of 0-10, where 0 = not difficult at all and 10 = very difficult, how difficult was managing diabetes when you were 14-18 years old (i.e. before college/university)?
A: 0-10
8. On a Scale of 0-10, where 0 = not difficult at all and 10 = very difficult, how difficult is managing diabetes currently, in college/university?
A: 0-10
9. On a scale of 0-10, where 0 = the worst you can imagine and 10 = the best you can imagine, taking all things into consideration, how good is your life these days?
A: 0-10
10. Using the same scale, how good would it be if you did not have diabetes?
A: 0-10

Third Page of Questions:

11. My parents were involved in my diabetes management when I was 14-18 years old (i.e. before college/university)
A: 1. Far not enough, 2. Not enough, 3. Just right, 4. Too much, 5. Far too much
12. My parents were protective of me when I was 14-18 years old (i.e. before college/university)
A: 1. Far not enough, 2. Not enough, 3. Just right, 4. Too much, 5. Far too much
13. My parents worried about my diabetes when I was 14-18 years old (i.e. before college/university)
A: 1. Far not enough, 2. Not enough, 3. Just right, 4. Too much, 5. Far too much
14. My parents gave me responsibility for my diabetes when I was 14-18 years old (i.e. before college/university)
A: 1. Far not enough, 2. Not enough, 3. Just right, 4. Too much, 5. Far too much
15. I communicated with my parents when I was 14-18 years old (i.e. before college/university)
A: 1. Very poorly, 2. Poorly, 3. Neither poorly, nor well, 4. Well, 5. Very well

Fourth Page of Questions:

16. What was a typical HbA1c for you when you were 14-18 years old (i.e. before college/university)?
A: Less than 6% (less than 40 mmol/mol), 6-8% (40-65 mmol/mol), 8-10% (65-85 mmol/mol), Greater than 10% (Greater than 85 mmol/mol), Cannot remember even to guess
17. What is a typical HbA1c for you these days?
A: Less than 6% (less than 40 mmol/mol), 6-8% (40-65 mmol/mol), 8-10% (65-85 mmol/mol), Greater than 10% (Greater than 85 mmol/mol), Cannot remember even to guess
18. What was your last HbA1c?
A: Less than 6% (less than 40 mmol/mol), 6-8% (40-65 mmol/mol), 8-10% (65-85 mmol/mol), Greater than 10% (Greater than 85 mmol/mol), Cannot remember even to guess
19. How long ago was your last HbA1c taken?
A: 0-3 months, 4-6 months, 7-9 months, 10-12 months, Longer than a year

Fifth Page of Questions:

20. On how many of the last SEVEN DAYS did you follow a healthful eating plan?
A: 0-7
21. On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables a day?
A: 0-7
22. On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity?
A: 0-7
23. On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?
A: 0-7
24. On how many of the last SEVEN DAYS did you take your diabetes medications (insulin) exactly when and how they were prescribed?
A: 0-7
25. On how many of the last SEVEN DAYS did you think - at least ONCE A DAY- about how your diet, activity, medications, or stress impact your blood sugar level?
A: 0-7
26. How often in the past SEVEN DAYS did you feel inconvenienced by your diabetes management?
A: 0-7
27. How often in the past SEVEN DAYS did you eat fast food/convenience foods due to a hectic schedule?
A: 0-7
28. On average, how many meals do you eat per day (including snacks)?
A: 0, 1, 2, 3, 4, 5, 6 or more
29. On a scale of 1-5, where 1 = very unhappy and 5 = very happy, how happy are you with your current weight?
A: 1-5
30. How many days per week do you exercise?
A: 0-7

Sixth Page of Questions:

31. If you are using insulin injections, how many times per day do you inject yourself on a typical day?
A: 0, 1-2, 3-4, 5-6, 7-8, 9 or more, Not injecting but using a pump
32. If you are using an insulin pump, how many times per day do you bolus on a typical day?
A: 0, 1-2, 3-4, 5-6, 7-8, 9 or more, Not using a pump but injecting
33. Do you use on most days a continuous glucose monitor (CGM)?
A: Yes / no
34. On average, how many times do you check your blood sugar each day?
A: 0, 1-2, 3-4, 5-6, 7-8, 9 or more

Seventh Page of Questions:

35. On a scale of 1-5, where 1 = no stress and 5 = highest stress, how high would you rate your stress level in college/university?
A: 1-5
36. On a scale of 1-5, where 1 = not at all and 5 = very much, how much does stress in college/university interfere with your diabetes management?
A: 1-5
37. On a scale of 1-5, where 1 = no stress and 5 = highest stress, how high would you rate your stress level when you were 14-18 years old (i.e. before college/university)?
A: 1-5
38. On a scale of 1-5, where 1 = no chaos and 5 = great chaos, how high would you rate the chaos level in your life (i.e. lack of routine from day to day)?
A: 1-5
39. On a scale of 1-5, where 1 = not at all and 5 = very much, how much does chaos in your life interfere with your diabetes management?
A: 1-5

Eighth Page of Questions:

40. How soon after you meet someone will you disclose that you have diabetes?
A: Right Away, After a week or two, After a couple of months, After a year or longer, Never
41. Would you ever keep the fact that you have diabetes from someone to fit in?
A: Yes, I might keep it from them or No, I would not keep it from them
42. In a typical week, on how many days do you drink alcoholic beverages?
A: 0-7
43. In a typical day, how many alcoholic drinks would you have on average?
A: 0, 1-2, 3-4, 5-6, 7-8, 9 or more
44. Do you drink less alcohol than your peers, because you have diabetes?
A: Yes, I drink less alcohol than my peers BECAUSE of my diabetes or No, the fact that I have diabetes does not affect how much alcohol I drink

Ninth Page of Questions:

45. Do you see a diabetes specialist?
A: Yes or No

46. If yes, how often do you usually see the specialist?
A: Every 1-3 months, Every 4-6 months, Every 7-9 months, Every 10-12 months, More than once a year
47. Do you have access to a diabetes specialist as often as you feel you need?
A: Yes or No
48. Do you feel that you have access to the best possible diabetes care, even if you choose not to use it?
A: Yes or No
49. Are you currently covered by health insurance or do you have to pay for health care out of pocket?
A: mostly insurance, state or other "third party" or Mostly out of pocket
50. How involved were your parents in your diabetes management when you were 14-18 years old (i.e. before college/university)?
A: 1. Far not enough, 2. Not enough, 3. Just right, 4. Too much, 5. Far too much
51. How involved are your parents in your diabetes management in college/university?
A: 1. Far not enough, 2. Not enough, 3. Just right, 4. Too much, 5. Far too much

Tenth Page of Questions:

Please indicate whether you have done any of the following **in the past 3 months**:

52. Gotten drunk
A: Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times
53. Used hard drugs (e.g. LSD, coke, crack, etc.)
A: Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times
54. Smoked cigarettes
A: Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times
55. Had sexual intercourse without you-your partner using birth control
A: Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times
56. Had sexual intercourse without you-your partner using condoms
A: Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times

Eleventh Page of Questions:

For the following statements, choose the answer that best describes your reaction:

57. I am unhappy because of my diabetes.
A: 1. Strongly disagree, 2. Disagree, 3. Undecided/Neutral, 4. Agree, 5. Strongly agree
58. I don't test my blood sugar as often as I should because I am afraid of what I will find.
A: 1. Strongly disagree, 2. Disagree, 3. Undecided/Neutral, 4. Agree, 5. Strongly agree
59. I feel my diabetes controls me.
A: 1. Strongly disagree, 2. Disagree, 3. Undecided/Neutral, 4. Agree, 5. Strongly agree
60. Having diabetes is stressful.
A: 1. Strongly disagree, 2. Disagree, 3. Undecided/Neutral, 4. Agree, 5. Strongly agree

Optional Questions:

1. *Been in any physical fights*
A: Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times
2. *Stolen something*
A: Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times

3. *"Trashed" or vandalized something*
A: *Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times*
4. *Gotten rowdy at a party*
A: *Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times*
5. *Gotten in trouble with college/university authorities*
A: *Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times*
6. *Gotten in trouble with the police*
A: *Never, 1-2 times, 3-4 times, 5-6 times, 7 or more times*
7. *My diabetes doctors/nurses/etc. did not listen to me very much when I was 14-18 years old (i.e. before college/university)*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*
8. *My diabetes doctors/nurses/etc. told me what to do without paying any attention to my opinion when I was 14-18 years old (i.e. before college/university)*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*
9. *My diabetes doctors/nurses/etc. collaborated with me in figuring out how to best manage my diabetes when I was 14-18 years old (i.e. before college/university)*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*
10. *My diabetes doctors/nurses/etc. often got angry at me when I was 14-18 years old (i.e. before college/university)*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*
11. *I liked going to see my diabetes doctors/nurses/etc. when I was 14-18 years old (i.e. before college/university)*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*
12. *I found my diabetes doctors/nurses/etc. when I was 14-18 years old supportive (i.e. before college/university)*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*
13. *My diabetes doctors/nurses/etc., when I was 14-18 years old (i.e. before college/university), really worked hard to prepare me for managing my diabetes in college/university:*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*
14. *I was ready to manage the challenges of college/university life with diabetes when I first came to college/university:*
A: *1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree, nor disagree, 4. Somewhat agree, 5. Strongly agree*

Schreyer Honors College

ACADEMIC VITA

Academic Vita of Jessica Marie Berglund

Name: Jessica Marie Berglund

Address: 902 Evergreen Drive, Wyomissing, PA 19610

Email: jmb5311@gmail.com

Education: Pennsylvania State University

Major: Nutritional Science

Honors: Biobehavioral Health

Dietetic Internship: Sodexo Health Care Services- Diabetes Emphasis

Thesis Title: Struggles of Diabetes Management for College Students

Thesis Supervisor: Dr. Jan Ulbrecht

Work Experience:

Penn State Diet Assessment Center
Dietary Interviewer

University Park, PA

January 2009-present

- Perform dietary recalls over the phone for research purposes
- Administer various other questionnaires

Penn State “Cook Like a Chef” Day Camp
Counselor

University Park, PA

July 2009

- Supervised children ages 11 to 13 as they learned to cook independently
- Taught various nutrition related lessons

Berks Hematology Oncology Associates
Medical Records Specialist

West Reading, PA

October 2004- August 2008

- Pulled and filed patients’ charts
- Scanned and attached information to patients’ electronic charts

Wilson School District
Child Care Worker

West Lawn, PA

June 2004- February 2008

- Supervised and tutored children ages 3 to 12 years old
- Planned and prepared snacks for the children

Awards:

ADA Foundation's Commission on Dietetic Registration Scholarship	2009
Mary Burket Morrow Scholarship	2008, 2009
The President's Freshman Award	2007

Professional Memberships:

Association of Women in the Sciences	2008-Present
American Dietetic Association	2007-Present
Pennsylvania Dietetic Association	2007-Present

Community Service Involvement:

Nutrition Aide at Mount Nittany Medical Center	2009-Present
Head Counselor at Harrisburg Diabetic Youth Camp	2009-Present
Volunteer at JDRF Fundraising Gala	Spring 2009
Counselor at Harrisburg Diabetic Youth Camp	2005-Present
Nutrition Aide at Reading Hospital and Medical Center	Summer 2007